International Journal of Psychophysiology 88 (2013) 241–252

Contents lists available at SciVerse ScienceDirect

International Journal of Psychophysiology

journal homepage: www.elsevier.com/locate/ijpsycho

Attachment, skin deep? Relationships between adult attachment and skin barrier recovery

Theodore F. Robles *, Kathryn P. Brooks, Heidi S. Kane, Christine Dunkel Schetter

Department of Psychology, University of California, Box 951563, 1285 Franz Hall, Los Angeles, CA 90095-1563, USA

ARTICLE INFO

Article history:
Received 30 November 2011
Received in revised form 2 April 2012
Accepted 18 April 2012
Available online 27 April 2012

Keywords:
Attachment
Wound healing
Close relationships
Couple interactions
Skin barrier recovery

ABSTRACT

This study examined the relationship between individual differences in adult attachment and skin barrier recovery. Dating couples ($N = 34$) completed a self-report measure of attachment anxiety and avoidance, and during two separate laboratory visits, normal skin barrier function was disrupted using a tape-stripping procedure, followed by a 20 min discussion of personal concerns in one visit and relationship problems in the other, counterbalanced randomly across visits. Skin barrier recovery was assessed by measuring transepidermal water loss up to 2 h after skin disruption. Multilevel modeling showed that skin barrier recovery did not differ between the personal concern or relationship problem discussions. Among women, greater attachment anxiety predicted faster skin barrier recovery across the two visits, while greater attachment avoidance predicted slower skin barrier recovery. Among men, greater attachment anxiety predicted slower skin barrier recovery during the personal concern discussion only. The observed effects remained significant after controlling for transepidermal water loss in undisturbed skin, suggesting that the relationship between attachment security and skin barrier recovery was not due to other skin-related factors like sweating. Cortisol changes, self-reported emotions, stress appraisals, and supportiveness ratings were tested as potential mediators, and none explained the relationships between attachment and skin barrier recovery. These findings are the first to demonstrate associations between individual differences in attachment style and restorative biological processes in the skin, even in a sample of young dating couples in satisfied relationships.

1. Introduction

Relationships are central to human life, and the quality of one's social connections has a strong influence on health (Uchino, 2004). Within our intimate relationships, conflict is often related to physiological changes characteristic of the fight-or-flight response (Robles and Kiecolt-Glaser, 2003), which can be dampened by supportive behaviors (Robles et al., 2006). The physiological changes associated with support and strain in relationships are frequently cited as key mechanisms explaining how the quality of close relationships can "get under the skin" and impact physical health (Loving et al., 2006; Robles and Kiecolt-Glaser, 2003; Slatcher, 2010). However, much like research on physiological responses to acute stress (Kiecolt-Glaser et al., 1992), many of the observed changes in cardiovascular, endocrine, and immune function in response to interpersonal interactions are well within the normal ranges, and their clinical significance is unclear. Thus, determining whether the physiological changes associated with close relationship events have meaningful consequences for health is a key direction for the field (Pietromonaco et al., in press).

The skin is an ideal organ system in which to study the interplay between close relationship functioning and health. The primary function of skin is to provide a protective barrier for internal tissues against the outside world through physical, chemical, and biological means (Elias, 2005). The skin is highly innervated by the central nervous system and is a target for neuroendocrine factors involved in the stress response (Arck et al., 2006). In addition, chemical messengers in the immune system (cytokines), play significant roles in the barrier function of the skin, particularly restoration of the barrier following damage through physical injury (Nickoloff and Naidu, 1994). Even minor damage to the skin, such as the removal of cells in the upper layer of the epidermis through a carpet burn, initiates a cascade of immune-mediated events involved in repairing the skin barrier, and these events occur immediately following damage to the skin. For example, immediately after skin barrier disruption, pre-formed proinflammatory cytokines are released in the upper epidermal layer (Hauser et al., 1986; Tsai et al., 1994; Wood et al., 1997), and proinflammatory cytokines are synthesized in the hours following disruption (Nickoloff and Naidu, 1994). Studying the effects of psychosocial factors on skin repair provides a clinically relevant health outcome that can be measured in a short amount of time in healthy individuals.

Abbreviations: AUCg, area under the curve with respect to ground; ECR-R, Experiences in Close Relationships — Revised; HPA, hypothalamic-pituitary-adrenal; TEWL, transepidermal water loss.

* Corresponding author. Tel.: +1 310 794 9362; fax: +1 310 206 5895.
E-mail address: robles@psych.ucla.edu (T.F. Robles).

0167-8760/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
doi:10.1016/j.ijpsycho.2012.04.007

Importantly, skin function is influenced by psychological stress. According to a recent meta-analysis, stressors including laboratory tasks, academic exams, and chronic stress are related to delayed skin barrier recovery, with a moderate effect size ($r = -.38$) (Walburn et al., 2009). For example, performing an acute laboratory stressor was related to delayed skin barrier recovery 2–3 h later (Altemus et al., 2001; Robles, 2007). Social support provided by a confederate before the stressor did not influence recovery (Robles, 2007), leading us to conclude that support from an individual's social network, such as the presence of a significant other, may have greater bearing on skin barrier recovery and wound healing.

Indeed, social bonds are related to wound healing in both animals and humans. Socially isolated rodents show slower wound healing following exposure to an immobilization stressor compared to socially housed rodents (Detillion et al., 2004). Moreover, in two monogamous mouse species, separation from partners prior to wounding was related to delayed wound healing (Glasper and DeVries, 2005). In addition, paired mice that were physically separated by a mesh barrier but still able to see and smell each other showed faster wound healing compared to isolated mice. In humans, greater perceived stress was related to delayed skin barrier recovery in a sample of women, of whom half were going through divorce or separation (Muizzuddin et al., 2003). Beyond the presence or absence of close others, the quality of close relationships is also related to wound healing. Specifically, blister wound healing was slower during a hospital visit that included a problem-solving discussion designed to elicit conflict, compared to a personal concern-related discussion designed to elicit support, and couples who showed more negative behaviors during those discussions had slower wound healing (Kiecolt-Glaser et al., 2005). Taken together, these findings suggest that close relationships may be an important factor in skin barrier recovery and wound healing.

Thus far, research on the links between close relationships and skin function, and close relationships and physical health outcomes more broadly, has focused primarily on presence (in animals) or quality of social relationships (in humans). In humans, relationship quality is measured by observing behavior during interpersonal discussions or asking individuals to report their perceptions of social support, social strain, or relationship satisfaction. However, perceptions of relationship quality and behavior in interpersonal interactions are shaped in part by the individual and relational histories that individuals bring to the relationship. Adult attachment theory provides a framework for characterizing and measuring contributions of such individual differences to close relationships (Fraley and Shaver, 2000).

According to adult attachment theory (Bowlby, 1969; Fraley and Shaver, 2000), individuals have an innate behavioral attachment system that monitors the presence and responsiveness of attachment figures, including caregivers in infancy and romantic partners in adulthood. Moreover, early-life experiences with caregivers lead to variations in the attachment system along two independent dimensions: 1) attachment *anxiety,* and 2) attachment *avoidance* (referred to here as anxiety and avoidance). The anxiety dimension captures the degree to which individuals worry about rejection or loss of closeness in a romantic relationship. The avoidance dimension captures the degree to which individuals are uncomfortable with intimacy and closeness in a romantic relationship. These dimensions were originally thought to reflect features of social–cognitive models of the self and the close relationship partner, referred to as *internal working models*, but more recent conceptualizations view the dimensions as reflecting the organization of attachment behavioral system dynamics more generally (Fraley and Shaver, 2000). According to Fraley and Shaver (2000), the anxiety dimension is primarily an appraisal-monitoring system that gauges the closeness of the attachment figure and monitors for threat-related cues, while the avoidance dimension regulates behavior towards or away from the attachment figure, especially during anxiety-provoking situations. The systems are thought to operate in parallel, to influence each other via reciprocal feedback, and to operate automatically. Importantly, individuals differ in the degree to which they monitor closeness and maintain distance; some overly monitor their relationship for signs of threat and others overly distance themselves from close others.

Given the importance of close social relationships more generally (Uchino, 2004), and the role of the attachment system in monitoring and regulating distance in those relationships, and emotion regulation more broadly, many propose that the attachment system plays an important role in physical health (Diamond and Fagundes, 2010; Hofer, 1984; Maunder and Hunter, 2001; Pietromonaco et al., in press; Sbarra and Hazan, 2008). One reason for hypothesizing a role in physical health is research showing relationships between adult attachment and stress-responsive biological systems, including the hypothalamic-pituitary-adrenal (HPA) axis (Brooks et al., 2011; Diamond and Fagundes, 2010; Kidd et al., 2011; Powers et al., 2006), autonomic nervous system (Diamond et al., 2006; Holland and Roisman, 2010; Maunder et al., 2006; Roisman, 2007), and more recently, the immune system (Gouin et al., 2009).

Specifically, greater *insecure attachment*, including high anxiety or high avoidance, is related to elevated reactivity to brief laboratory stressors, including public speaking and mental arithmetic, in the HPA axis and the sympathetic branch of the autonomic nervous system (Diamond and Fagundes, 2010). In addition, greater attachment avoidance in women and anxiety in men predicted greater cortisol reactivity to a problem-solving discussion (Powers et al., 2006). In our recent work from the same sample as this study, greater attachment anxiety in men predicted greater cortisol reactivity to a problem-solving discussion, and greater attachment avoidance in men predicted greater partners' cortisol reactivity to a problem-solving and personal concern discussion (Brooks et al., 2011). Taken together, these studies demonstrate the role of the attachment system in stress-responsive biological systems, and suggest that there may be gender differences in the relationship between adult attachment and physiological responses to interpersonal discussions.

Activity in stress-responsive biological systems is also proposed as explanatory mechanisms for links between psychosocial factors and skin function (Garg et al., 2001; Robles and Carroll, 2011). Animal models suggest that enhanced levels of cortisol impair wound healing. For example, wound healing delays in stressed hamsters were reversed by suppression of cortisol production (Detillion et al., 2004), and the effects of stress on skin barrier recovery can be blocked by glucocorticoid antagonists (Choi et al., 2006). In addition, the skin is highly innervated by sympathetic nerves, which cause sweating, and may also contribute to wound healing (Souza et al., 2005). Thus, taken together with evidence suggesting that social context can modulate wound healing, the attachment system may have implications for skin barrier recovery and wound healing.

The aims of the current study were to examine the association between attachment and skin barrier recovery in the context of couple interactions, and in a sample of young, healthy dating couples in committed relationships. While studies involving couple interactions and physiology in the laboratory typically focus on discussions involving problems in the relationship, couples frequently turn to each other for support when discussing personal concerns (Gable et al., 2006; Pasch and Bradbury, 1998). Thus, in this study couples participated in two visits similar to prior work (Kiecolt-Glaser et al., 2005). During one visit, couples discussed an area of personal concern, intended to promote the exchange of social support. During the other visit, couples attempted to solve problems in their relationship. Prior to the discussions, the skin barrier was disrupted in both partners using tape-stripping, and we also collected salivary cortisol and psychological responses during the visits.

Based on the prior research in married couples and blister wound healing described above, we expected slower skin barrier recovery